

SECTION 323113 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Galvanized steel chain link fence and gates shown on the Drawings.
 - 2. Refer to site Layout Plans for fencing heights and gate locations and sizes.
 - 3. Cantilever gates and electrically controlled operators.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 31 Section "Site Clearing" for clearing for fence installation.
 - 2. Division 31 Section "Earthwork" for filling and grading work.

1.3 SUBMITTALS

- A. Product Data in the form of manufacturer's technical data, specifications, and installation instructions for fence and gateposts, fabric, gates, operators, and accessories. Provide samples (6 inch sections) of fence fabric and typical line posts for review.
- B. Shop Drawings showing location of fence, gates, each post, and details of post installation, extension arms, gate swing, hardware, and accessories.

1.4 QUALITY ASSURANCE

- A. The Fence Material Manufacturer shall visit the job site and certify in writing that all materials and installation are in accordance with the Contract Documents and with the manufacturer's written instructions.
- B. Single-Source Responsibility: Obtain chain link fences and gates as complete units, including necessary erection accessories, fittings, and fastenings from a single source or manufacturer.

1.5 PREINSTALLATION CONFERENCE

- A. Conduct conference at Project site to comply with requirements in Section "Project Management and Coordination."

1.6 PROJECT CONDITIONS

- A. Contractor shall engage services of licensed surveyor to provide horizontal control and layout for fencing.
- B. Field Measurements: Verify layout information for fences and gates shown on the Drawings in relation to the property survey and existing structures. Verify dimensions by field measurements. Provide and install stakes for fence layout for review by Owner/Architect prior to beginning

installation of posts. Stake all corners, gate locations, points of deflection and along straight runs at 100-foot intervals.

- C. Contractor shall clear and remove trees, brush, etc. as required to complete fence installation.

PART 2 - PRODUCTS

2.1 FABRIC

- A. Selvage: Fabric 72 inches high and over with 2 or 1¾ inch mesh shall be knuckled at one selvage and twisted at another. All mesh 60 inches high and under shall be knuckled at both selvages.
- B. Steel Chain-Link Fence Fabric: Fabricated in one-piece widths for fencing 12 feet and less in height to comply with ASTM A392 Chain Link Fence Manufacturers Institute (CLFMI) CLF 2445 and requirements indicated below.
- C. Fencing Mesh and Wire Schedule:
1. 2-inch mesh, 9 gage wire fabric shall be used for all permanent fencing.

2.2 FINISHES

- A. Finish Coating: ASTM A392, Type II, Class I, zinc-coating applied after weaving.
1. Fabric: Not less than 1.2 oz. zinc per square foot.
 2. Framing: Not less than 1.8 oz. zinc per square foot.

2.3 FRAMING

- A. Round member sizes are given in actual outside diameter (OD) to the nearest thousandth of inches. Round fence posts and rails are often referred to in ASTM standard specifications by nominal pipe sizes (NPS) or the equivalent trade sizes in inches. The following indicates these equivalents all measured in inches.
- B. Strength requirements for posts and rails conforming to ASTM F 669.
- C. Pipe shall be straight, true to section, material, and sizes specified, and shall conform to the following weights per foot:

NPS in Inches	Outside Diameter (OD) in inches	Type I Steel	Type II Steel
1	1.315	1.68	1.35
1-1/4	1.660	2.27	1.84
1-1/2	1.900	2.72	2.28
2	2.375	3.65	3.12
2-1/2	2.875	5.79	4.64
3	3.500	7.58	5.71
3-1/2	4.000	9.11	6.56
4	4.500	10.79	_____
6	6.625	18.97	_____
8	8.625	28.55	_____

- D. Steel Framework, General: Posts, rails, braces, and gate frames.

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1. Type I Round Posts: Hot-dipped galvanized steel pipe conforming to ASTM F 1083, plain ends, standard weight (schedule 40) with not less than 1.8 oz. zinc per sq. ft. of surface area coated.
 2. Type II Round Posts: Manufactured from steel conforming to ASTM A 569 or A 446, grade D, cold formed, electric welded with minimum yield strength of 50,000 psi and triple coated with minimum 0.9 oz. zinc per sq. ft. after welding, a chromate conversion coating and a clear polymer overcoat. Corrosion protection on inside surfaces shall protect the metal from corrosion when subjected to the salt spray test of ASTM B 117 for 300 hours with the end point of 5 percent Red Rust.
- E. Roll-Formed Steel Shapes: C-sections, produced from structural steel conforming to ASTM A570, Grade D. Comply with ASTM F 1043, Material Design Group II, with minimum yield strength of 45,000 psi (310 MPa); and the following coating requirements:
1. Coating: Type A, consisting of not less than minimum 2.0-oz./sq. ft. (0.61-kg/sq.m) average zinc coating per ASTM A 123/A 123M or 4.0-oz./sq. ft. (1.22-kg/sq.m) zinc coating per ASTM A 653/A653M.
- F. Steel posts for fabric heights up to 6 feet:
1. End, corner, and pull post
 - a. Up to 6 feet: 2.875 inch OD Type I or II steel pipe.
 2. Line or intermediate posts
 - b. Up to 6 feet: 2.375 inch OD Type I or II steel pipe or rolled-formed steel C-section equivalent.
- G. Steel posts for fabric heights over 6 and not exceeding 12':
1. End, Corner, Pull Post 2.875 O.D. Type I or II
 2. Line or intermediate Post 2.375 O.D. Type I or II or rolled-formed steel C-section equivalent.
- H. Swing Gate Posts: Furnish posts to support single gate leaf, or one leaf of a double-gate installation, according to ASTM F 900, sized as follows for steel pipe posts:
1. Steel posts for fabric height of 6 feet or less and gate leaf width:
 - a. 4 to 12 Feet: 3.00-inch OD pipe weighing at least 5.71 lb per ft.
- I. Sliding Gate Posts:
1. All Leaf Widths:
 - a. Type I Posts: Round; 4.00 inch outside diameter pipe, 9.10 pounds per lineal foot.
 - b. Type II Posts: 4.00 inch outside diameter pipe, 6.56 pounds per lineal foot.
- J. Top Rail: Manufacturer's longest lengths (17 to 21 feet) with swedged-end or expansion-type coupling, approximately 6 inches long for joining. Provide rail ends or other means for attaching top rail securely to each gate corner, pull, and end post. Provide top rail for all line posts.
1. Round Steel: 1.660-inch OD Type I or II steel pipe or rolled formed steel 1.625"x 1.25" channel-shaped top rail.
- K. Center and intermediate rails shall be the same as top rail.

2.4 FITTINGS AND ACCESSORIES

- A. Material: Comply with ASTM F 626. Mill-finished aluminum or galvanized iron or steel to suit manufacturer's standards.
 - 1. Steel and Iron: Unless specified otherwise, hot-dip galvanize pressed steel or cast-iron fence fittings and accessories with at least 1.2 oz. zinc per sq. ft. as determined by ASTM A 90.
 - 2. Aluminum: Die cast conforming to ASTM B 26, aluminum-alloy 360 or sand cast conforming to ASTM B 85, aluminum-alloy 365, ZG61A, or Tenzalloy.
- B. Tie Wires: 12 gage (0.106 inch diameter) galvanized steel with a minimum of 0.80 oz. per sq. ft. of zinc coating of surface area in accordance with ASTM A 641, Class 3 or 9 gage (0.106 inch diameter) aluminum wire alloy 1100-H14 or equal, to match fabric core material.
- C. Post Brace Assembly: Manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 3/8-inch diameter rod and adjustable tightener. Provide manufacturers standard galvanized steel or cast iron or cast aluminum cap for each end.
- D. Post and Line Caps: Provide weather tight closure cap for each post. Provide line post caps with loop to receive top rail.
- E. Tension or Stretcher Bars: Hot-dip galvanized steel with minimum length 2 inches less than full height of fabric, minimum cross-section of 3/16 inch by 3/4 inch and minimum 1.2 oz. zinc coating per sq. ft. of surface area. Provide one bar for each gate and end post, and two for each corner and pull post, except where fabric is integrally woven into post.
- F. Tension and Brace Bands: Minimum 3/4-inch wide hot-dip galvanized steel with minimum 1.2 oz. zinc coating per sq. ft. of surface area.
 - 1. Tension Bands: Minimum 14 gage (0.074 inch) thick.
 - 2. Tension and Brace Bands: Minimum 12 gage (0.105 inch) thick.
- G. Concrete: Provide concrete consisting of Portland cement, ASTM C 150, aggregates ASTM C 33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2500 psi. Use at least 4 sacks of cement per cu. yd., 1-inch maximum size aggregate, maximum 3-inch slump, and 2 to 4 percent entrained air.
- H. Tension Wire: 7 gage steel, metallic-coated coil spring wire, in accordance with ASTM A 824, located at bottom of fence.

2.5 GATES

- A. Fabrication: Fabricate perimeter frames of gates from metal and finish to match fence framework. Assemble gate frames by welding. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware, and accessories. Space frame members maximum of 8 feet apart unless otherwise indicated.
 - 1. Provide same fabric as for fence unless otherwise indicated. Install fabric with tension bars and bands at vertical edges and with tie wires at top and bottom edges.

2. Install diagonal cross-bracing consisting of 3/8 inch-diameter adjustable-length truss rods on gates to ensure frame rigidity without sag or twist.
- B. Swing Gates: Comply with ASTM F 900.
1. Steel: Gates up to 8 feet wide
 2. Up to 6 feet high: Fabricate perimeter frames of minimum 1.660 inch OD Type I or II steel pipe or 1.90" o.d. tubular shaped steel.
- C. Gate Hardware: Provide hardware and accessories for each gate, galvanized per ASTM A 153, and in accordance with the following:
1. Hinges: Size and material to suit gate size, non-lift-off type, offset to permit 180-deg gate opening. Provide 1-1/2 pair of hinges for each leaf over 6 foot nominal height.
 2. Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.
 3. Keeper: Provide keeper for gates, which automatically engages gate leaf and holds it in open position until manually released.
 4. Gate Stops: Provide gate stops for the double gates, consisting of mushroom-type flush plate with anchors, set in concrete, and designed to engage center drop rod or plunger bar. Include locking device and padlock eyes as integral part of latch, permitting both gate leaves to be locked with single padlock.
- D. Slide Gate Operator
1. Furnish and install heavy duty slide gate operator, Viking H-10NX, 1 HP, single phase 226/230 volts or approved equal. Furnish with phone app (i-phone), hard wired low key pad with goose neck stands, UL 325 Infra-Red Outdoor Safety Thru-Beam Set for opening and closing and detection loops. Operator Shall have a 5 Year Commercial Warranty.

Install operation on concrete pad in accordance with manufacturer's recommendations.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install fence in compliance with ASTM F 567. Do not begin installation and erection before final clearing and grading is completed, unless otherwise permitted. Install fabric with knuckled edge up and twisted edge at bottom where applicable.
- B. Excavation: Drill or hand-excavate (using post-hole digger) holes for posts to diameters and spacings indicated, in firm, undisturbed or compacted soil.
1. If not indicated on drawings, excavate holes for each post to minimum diameter recommended by fence manufacturer, but not less than 4 times largest cross-section of post.
 2. Unless otherwise indicated, excavate hole depths approximately 3 inches lower than post bottom, with bottom of posts set not less than 36 inches below finish grade surface.
 3. Do not damage geotextile fabric supporting retaining walls. Fabric shall be cut as required to allow advancement of hold for fence post.
- C. Setting Posts: Center and align posts in holes 3 inches above bottom of excavation. Space maximum 10 feet o.c., unless otherwise indicated.

1. Protect portion of posts above ground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.
 - a. Unless otherwise indicated, extend concrete footings 1 inch above grade and trowel to a crown to shed water.
- D. Top Rails: Run rail continuously through line post caps, bending to radius for curved runs and at other posts terminating into rail end attached to posts or post caps fabricated to receive rail. Provide expansion couplings as recommended by fencing manufacturer.
- E. Brace Assemblies: Install braces at end and gateposts and at both sides of corner and pull posts. Locate horizontal braces at mid height of fabric on fences with top rail and at two-thirds fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- F. Fabric: Leave approximately 1 inch between finish grade and bottom selvage unless otherwise indicated. Pull fabric taut and tie to post, rails, and tension wires. Install fabric on security side of fence for general fencing and anchor to framework so that fabric remains in tension after pulling force is released.
- G. Tension or Stretcher Bars: Thread through or clamp to fabric 4 inches o.c., and secure to end, corner, pull, and gate posts with tension bands spaced not over 15 inches o.c.
- H. Tie Wires: Use U-shaped wire of proper length to secure fabric firmly to posts and rails with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing.
 1. Maximum Spacing: Tie fabric to line posts 12 inches o.c. and to rails and braces 24 inches o.c. Tie fabric to gate frames 6" o.c.
- I. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.
- J. Tension Wire: Tension wire to be stretched taut and secured to each line post with a tie wire and secured to each terminal post with a brace band prior to installation of fence fabric. Secure fence fabric to tension wire with 9 gauge hog rings at 18 inches on center.

3.2 GATE INSTALLATION

- A. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.3 GATE OPERATOR INSTALLATION

- A. Slide Gate Operators: Install gate operators in accordance with manufacturer recommendations. Installation shall include photo eyes and detection loops.

3.4 GROUNDING AND BONDING

- A. Fencing Grounding: Install at maximum intervals of 750 feet.
 1. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connector conductor to each fence component at the grounding location.

B. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.

1. Connections: Make connections so possibility of galvanic action or electrolysis is minimized.

END OF SECTION 323113

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